

Adoption of Digital Payment Systems Among Semi-Urban MSMEs: Barriers, Enablers, and Working Capital Outcomes

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Abstract— *Micro, small and medium enterprises in semi-urban settlements occupy an awkward position in the literature on digital payments. They are neither the rural households studied in the financial inclusion tradition nor the formalised urban firms studied in the technology adoption tradition, and the theoretical apparatus of each transfers only partially. This paper reviews what is known about digital payment adoption by such firms, organised around three questions: what impedes adoption, what enables it, and what happens to working capital once adoption occurs. It argues that the dominant explanatory frame — individual-level acceptance models built on perceived usefulness and ease of use — systematically under-weights the constraints that actually bind for a small trader, which are the cost of acceptance, the reconciliation burden, and the consequences of becoming visible to tax and regulatory systems. The enabling side has been transformed by interoperable public payment infrastructure, which decouples acceptance from the merchant's choice of provider and reduces the fixed cost of entry to close to zero, but the literature has not yet caught up with the implications for adoption theory. On working capital, the review finds a mechanism-rich but evidence-poor situation: the causal pathways from digital acceptance to shorter cash conversion cycles and improved credit access are well articulated, while the empirical base rests largely on cross-sectional self-report designs that cannot separate adoption from the firm characteristics that produced it. A research agenda is proposed centred on transaction-level data, credible identification, and the neglected question of who is left behind.*

Keywords— *Digital Payments; Micro Small and Medium Enterprises; Technology Adoption; Financial Inclusion; Working Capital; Semi-Urban Economy*

I. INTRODUCTION

The expansion of digital retail payments in developing economies is among the more consequential financial changes of the past two decades. Its documented effects at household level are substantial: access to mobile money in Kenya raised per capita consumption and moved an estimated two per cent of households out of poverty, with the mechanism running through improved risk-sharing, higher savings and changed occupational choice (Suri & Jack, 2016; Jack & Suri, 2014). These findings established digital payments as a development instrument rather than a convenience.

The parallel question on the firm side has received less attention, and the segment considered here — micro, small and medium enterprises (MSMEs) in semi-urban locations — less still. These firms matter disproportionately. They employ a large share of the non-agricultural workforce in most South and Southeast Asian economies, they operate predominantly on cash

and trade credit, and they sit at the point where formal and informal economies meet. Whether they accept digital payment determines whether the payment system reaches the last commercial mile.

Semi-urban settings deserve separate treatment because they combine features that the two dominant literatures handle separately. Connectivity and smartphone penetration approach urban levels, so infrastructural explanations for non-adoption lose much of their force. Firm formalisation, record-keeping practice and financial literacy, however, remain closer to rural norms. The result is a setting in which adoption is technically feasible but not obviously advantageous to the firm, which makes it analytically informative: it isolates the behavioural and institutional determinants from the infrastructural ones.

This paper reviews the literature on three linked questions. What prevents these firms from accepting digital payment? What has changed to make acceptance more attractive? And what happens to the firm's working capital position afterwards? Section 2 states the scope. Sections 3 and 4 set out the theoretical apparatus and the contextual specifics. Sections 5 and 6 examine barriers and enablers. Section 7 addresses working capital outcomes. Section 8 offers a critical appraisal of the evidence base, and Section 9 a research agenda.

II. SCOPE AND METHOD OF REVIEW

This is a narrative review structured around a conceptual argument rather than a systematic synthesis. It draws on three bodies of work that rarely cite one another: the information systems literature on technology acceptance, the development economics literature on digital financial services, and the smaller applied literature on MSME digitalisation in emerging economies.

Studies were included where they address payment technology adoption or use by small firms, or where they establish a theoretical or empirical result that such studies rely upon. Consumer-side adoption research is included selectively, because much MSME research borrows its instruments directly from it — a borrowing this paper treats as a problem rather than a convenience. Geographic emphasis falls on South and Southeast Asia and sub-Saharan Africa, where the relevant policy experiments have occurred.

Two exclusions are deliberate. Work on cryptocurrency and central bank digital currency is set aside as addressing a different question. Descriptive industry and consultancy reporting is used only for institutional facts, not for causal claims.

III. THEORETICAL APPARATUS AND ITS LIMITS

Research on payment adoption is dominated by a family of models originating in the technology acceptance model (Davis, 1989; Davis et al., 1989) and consolidated in the unified theory of acceptance and use of technology (Venkatesh et al., 2003), later extended to consumer contexts as UTAUT2 (Venkatesh et al., 2012). These models explain behavioural intention through perceived usefulness and ease of use, or through performance expectancy, effort expectancy, social influence and facilitating conditions, with variants incorporating trust, risk and innovativeness. Extensions of the framework to Indian mobile payment consumers are numerous and generally find the expected relationships (Venkatesh & Davis, 2000; Baker et al., 2007; Chiou & Shen, 2012).

Three limitations matter for the MSME case.

First, these models were developed to explain individual acceptance of systems in organisational settings, and the criterion variable is normally behavioural intention rather than sustained use. For a merchant, the decision is not whether to use a technology but whether to change a business process, and the relevant outcome is persistent acceptance across transactions, not stated intention.

Second, the constructs are perceptual. A merchant's decision turns substantially on objective quantities — the merchant discount rate, settlement latency, the cost of a device or the absence of one — which perceptual instruments capture only indirectly.

Third, and most importantly, acceptance models presume the decision is the adopter's alone. For payments it is not: a merchant accepts what customers offer. Adoption is a two-sided network problem, and single-sided models cannot represent it.

Organisational frameworks address part of this. The technology–organisation–environment framework (Tornatzky & Fleischer, 1990) accommodates firm-level and external determinants, and diffusion theory (Rogers, 2003) supplies the network and observability concepts that acceptance models lack. Studies of Indian MSME technology adoption more broadly have used exploratory factor approaches to identify firm-level determinants (Patil & Vashishtha, 2024). The literature has nonetheless continued to favour individual acceptance instruments, largely because they are easier to administer.

IV. THE SEMI-URBAN MSME CONTEXT

Several features distinguish the setting.

Most such firms are unregistered or minimally registered, and many operate below tax registration thresholds. Record-keeping is informal, frequently a single ledger combining business and household accounts. Working capital is financed through supplier trade credit, informal lending and retained cash rather than through bank facilities, a pattern consistent with the broader evidence that small firms face binding financial and legal constraints on growth (Beck et al., 2005). Trade credit substitutes for bank credit where information problems are severe, and the supplier relationship carries informational value that a formal lender cannot replicate (Petersen & Rajan, 1997).

Cash serves functions beyond payment in this environment. It is the medium of trade credit settlement, it permits

discretionary pricing and discounting, and it keeps turnover unobserved. Each of these is a genuine economic function, and a shift to digital payment disturbs all three. Analyses that treat cash preference as inertia or low literacy misread the situation.

Measurement of digital financial inclusion has become more systematic, with composite indices now available at country level (Khera et al., 2022) and a longer tradition of index construction in the Indian financial inclusion literature (Chakravarty & Pal, 2013; Bhanot et al., 2012). These operate at a level of aggregation well above the firm, which is part of why firm-level evidence remains thin.

V. BARRIERS

The literature identifies barriers that can be grouped into four types, of which only the first is infrastructural.

Infrastructure and device constraints. Intermittent connectivity, power interruption and the cost of a smartphone or terminal. These dominate rural analyses and are increasingly secondary in semi-urban ones, though settlement failures and transaction timeouts remain corrosive of trust because the merchant bears the ambiguity while the customer walks away.

Cost of acceptance. Card acceptance carries a merchant discount rate that is material against the margins typical of small retail. Where acceptance is free at the point of use, this barrier largely disappears — which is precisely why the design of the payment instrument, rather than the merchant's attitude, often determines the outcome. The economics of the stakeholder structure underlying mobile payment systems was set out early (Au & Kauffman, 2008) and remains the sharpest available account of why merchant-side pricing governs adoption.

Capability and reconciliation burden. Digital acceptance generates a transaction record that must be reconciled against stock and ledger. For a firm without accounting practice this is new work, and it recurs daily. Studies emphasising financial and digital literacy capture part of this, but the burden is procedural as much as cognitive.

Visibility and formalisation. Digital acceptance renders turnover legible to tax authorities and, in principle, to regulators. For a firm operating near a registration threshold this is a real cost, not a perception to be corrected. It is the barrier least well represented in the survey literature, because respondents have obvious reasons not to report it, and its omission is likely to bias the estimated importance of every other factor upward.

Trust, perceived risk and fraud exposure cut across these categories. Fraud in particular is asymmetric: a single loss is salient, attributable and discussed within the trader community, so the behavioural response is disproportionate to the expected loss.

VI. ENABLERS

The most consequential change has been infrastructural rather than attitudinal. Interoperable, publicly specified payment rails decouple acceptance from the merchant's choice of provider: a merchant displaying a single code can receive from any customer on any application, and the fixed cost of acceptance falls to the cost of printing. This dissolves the coordination problem that had previously required either a

dominant platform or an expensive terminal estate, and it makes the two-sided network problem of Section 3 tractable from the customer side, since customer adoption then propagates directly into merchant acceptance.

Customer demand is accordingly the dominant proximate enabler in most reported studies. A merchant who refuses digital payment loses sales to a neighbouring merchant who does not, and this competitive mechanism operates independently of the merchant's own assessment of usefulness — a result the acceptance models predict poorly, since it turns on the choices of non-adopters' customers rather than on the adopter's beliefs.

Two further enablers have received attention. Digital transaction records constitute a credit history where none existed, opening cash-flow-based lending to firms with no collateral and no audited accounts. And digital identity infrastructure reduces onboarding cost, which had previously made small merchants unprofitable to acquire.

The broader evidence that digital financial services affect real outcomes at the household level is now strong (Suri & Jack, 2016; Jack et al., 2013), and cross-country work associates digital financial inclusion with financial development and stability (Ahamed & Mallick, 2019; Asongu, 2015). The firm-level analogue is assumed more often than demonstrated.

VII. WORKING CAPITAL OUTCOMES

Four mechanisms are proposed in the literature linking digital acceptance to working capital.

Compression of the cash conversion cycle. Digital receipts settle faster and more predictably than cash deposited on a merchant's own schedule, reducing idle cash and the working capital held against timing uncertainty.

Reduced cash handling costs. Counting, storage, transport and shrinkage all carry costs that fall with digitisation, and the security risk of holding cash falls with it.

Credit access through transaction history. Verified receipts substitute for the collateral and documentation that small firms cannot supply, addressing the constraint documented by Beck et al. (2005) and potentially reducing dependence on the trade credit that Petersen and Rajan (1997) show firms use when bank credit is rationed.

Separation of business and household accounts. Distinct digital flows make the boundary observable, which may reduce leakage of working capital into household consumption.

The mechanisms are plausible and mutually reinforcing. The evidence is weaker than the confidence with which they are asserted. Most firm-level studies are cross-sectional, rely on self-reported outcomes, and compare adopters with non-adopters without addressing the obvious problem that adoption is chosen by firms that differ systematically in growth orientation, owner education and customer base. The observed association between adoption and improved working capital is therefore consistent with adoption causing improvement, with better-managed firms adopting earlier, or with both. Very few studies attempt to distinguish these.

There are also plausible offsetting effects that the literature rarely examines. Digital settlement can lengthen rather than shorten the cycle where settlement is delayed or where funds arrive in an account the owner does not readily draw on. Tax

liability crystallised by visible turnover is a direct working capital cost. And formal credit obtained on the strength of transaction history carries repayment obligations whose effect on liquidity may be negative in the short run.

VIII. CRITICAL APPRAISAL

Four weaknesses characterise the evidence base.

Instrument transfer without adaptation. Constructs designed for individual consumers are administered to firm owners with minimal modification. Performance expectancy items phrased around personal convenience do not capture merchant economics, and the resulting models fit well while explaining little of practical interest.

Reliance on intention as outcome. Where sustained acceptance is the phenomenon of interest, measuring stated intention substitutes a weakly related proxy. Transaction data would resolve this and is increasingly available in principle.

Absence of identification. Cross-sectional comparison of adopters and non-adopters cannot support the causal claims routinely made from it. Policy changes, staggered infrastructure rollout and threshold rules offer identification opportunities that remain largely unexploited at the firm level.

Selective reporting of context. The tax visibility barrier is systematically under-reported for reasons intrinsic to the survey method. Studies that acknowledge it typically do so through qualitative work, and the quantitative literature has not found a way to incorporate it.

A fifth issue is definitional, and it is more damaging than it appears. "Adoption" ranges across studies from possessing a payment application, to displaying a code, to accepting occasional digital payment, to conducting a majority of turnover digitally. These are different phenomena with different determinants and different consequences. A merchant who displays a code but discourages its use has adopted on any binary measure and changed nothing about the firm's cash position. A merchant receiving most turnover digitally has changed the firm's financial structure. Pooling the two, as binary measures require, guarantees that estimated effects on working capital will be attenuated toward zero and that determinants specific to intensive use will be invisible.

The remedy is to treat adoption as a continuous measure of intensity — digital receipts as a share of turnover — and to model the determinants of intensity separately from those of initial acceptance. There is good reason to expect these to differ. Initial acceptance is driven by customer demand and the near-zero cost of entry; intensity is driven by whether the merchant finds the reconciliation manageable, whether settlement is reliable, and whether the formalisation consequences prove tolerable. A literature that measures only the first will conclude that adoption is easy and its determinants weak, which is roughly what it has concluded.

Finally, the units of analysis are frequently confused. Some studies survey firm owners and report firm-level conclusions; others survey employees and generalise to the firm. In micro-enterprises the owner and the firm are effectively identical, but in small and medium firms they are not, and the person answering a questionnaire about payment technology may not be the person who decides.

IX. RESEARCH AGENDA

Firm-appropriate instruments. Adoption research on merchants should measure acceptance cost, settlement experience, reconciliation burden and formalisation exposure directly, rather than inferring them through perceptual proxies borrowed from consumer research.

Transaction-level outcome measurement. Where merchants consent to data access, receipts data provide objective measures of intensity, persistence and seasonality that survey instruments cannot approach.

Credible identification. Staggered rollouts, registration thresholds and policy discontinuities should be used to estimate working capital effects rather than inferring them from cross-sectional association.

Attention to discontinuation. The literature studies adoption and neglects abandonment. Merchants who accept digitally and then revert are the most informative cases available, and they are almost entirely unstudied.

Distributional questions. Aggregate adoption statistics conceal who is excluded. Firms run by older, less literate or female owners, and those in the least connected settlements, warrant direct study rather than treatment as residual.

X. CONCLUSION

Digital payment acceptance among semi-urban MSMEs has been driven less by changes in what merchants believe than by changes in what the payment system costs them and what their customers expect. This has an uncomfortable implication for a literature built predominantly on perceptual acceptance models: those models have been fitted to a phenomenon whose principal determinants lie outside them.

The barriers that now bind are the cost of acceptance where it remains positive, the recurring burden of reconciliation, and the exposure to formalisation that digital records create. The last of these is the least studied and probably the most important, and its omission distorts the estimated weight of everything else.

On working capital, the mechanisms are convincing and the evidence is not yet adequate to them. Establishing whether digital acceptance improves the liquidity position of small firms — and for which firms, and by how much — requires transaction-level data and identification strategies that the field has the means to deploy but has largely not attempted. Until it does, the widely repeated claim that digitising payments strengthens small firms should be treated as a well-motivated hypothesis rather than a settled finding.

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